Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

Figure 1 shows a kettle a student used to determine the specific heat capacity of water.

Figure 1

The student placed different masses of water into the kettle and timed how long it took for the water to reach boiling point.

The student carried out the experiment three times.

The student's results are shown in the table below.

	Time for water to boil in seconds					
Mass of water in kg	**1**	**2**	**3**	**Mean**	**Mass × change in temperature in kg°C**	**Energy supplied in kJ**
0.25	55	60	63	59	20	131
0.50	105	110	116	110	40	243
0.75	140	148	141	143	60	314
1.00	184	190	183	182	80	401
1.25	216	215	211	214	100	471
1.50	272	263	266	267	120	587
1.75	298	300	302		140	

(a) Suggest how the student was able to ensure that the change in temperature was the same for each mass of water.

_____

_____

_____

_____

(2)

(b) Calculate the uncertainty in the student's measurements of time to boil when the mass of water was 1.75 kg.

_____

_____

Uncertainty = _____ s

(2)

(c) The power rating of the kettle is 2.20 kW.

Calculate the average electrical energy used by the kettle, in kJ, for 1.75 kg of water to reach boiling point.

_____

_____

_____

Average energy = _____ kJ

(2)

(d) Use information from the table above to calculate the change in temperature of the water during the investigation.

_____

_____

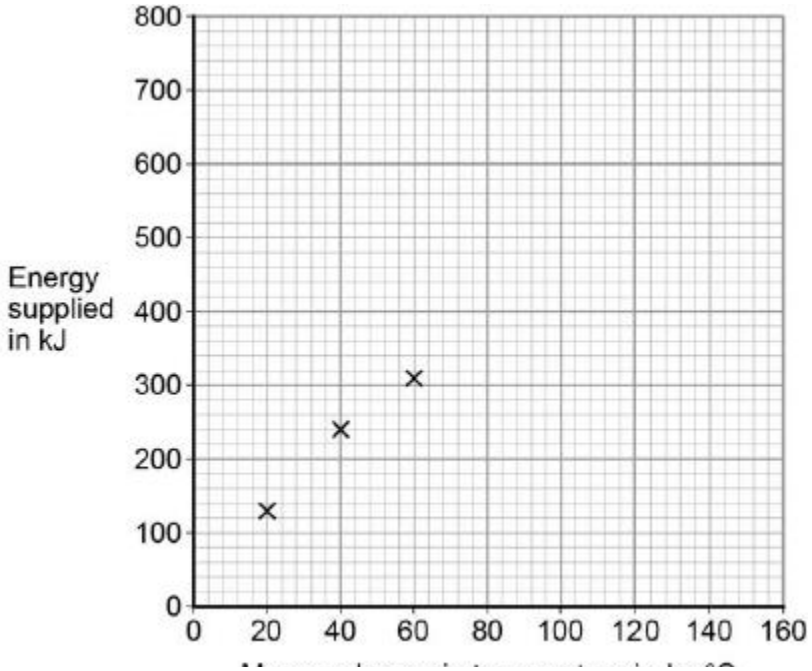
Change in temperature = _____ °C

(2)

(e) The student plotted a graph of energy supplied in kJ against mass × change in temperature in kg °C.

Figure 2 shows the graph the student plotted.

Figure 2



Use data from the table above to plot the four missing points.

Draw a line of best fit on the graph.

(3)

(f) Use the graph to determine the mean value of the specific heat capacity of water, for the student's investigation.

_____

_____

_____

_____

_____

Specific heat capacity of water = _____ J / kg °C

(4)

(g) The student's value for the specific heat capacity of water was greater than the accepted value.

Suggest why.

_____

_____

(1)

(h) The kettle used in the experiment had a label stating that the power rating of the kettle was 2.2 kW.

The student did not measure the power of the kettle.

Suggest why measuring the power of the kettle may improve the student's investigation.

_____

_____

(1)
(Total 17 marks)